

Respiratory Health and Air Movement Within Equine Indoor Arenas

Authors : Staci McGill, Morgan Hayes, Robert Coleman, Kimberly Tumlin

Abstract : The interaction and relationships between horses and humans have been shown to be positive for physical, mental, and emotional wellbeing, however equine spaces where these interactions occur do include some environmental risks. There are 1.7 million jobs associated with the equine industry in the United States in addition to recreational riders, owners, and volunteers who interact with horses for substantial amounts of time daily inside built structures. One specialized facility, an “indoor arena” is a semi-indoor structure used for exercising horses and exhibiting skills during competitive events. Typically, indoor arenas have a sand or sand mixture as the footing or surface over which the horse travels, and increasingly, silica sand is being recommended due to its durable nature. It was previously identified in a semi-qualitative survey that the majority of individuals using indoor arenas have environmental concerns with dust. 27% (90/333) of respondents reported respiratory issues or allergy-like symptoms while riding with 21.6% (71/329) of respondents reporting these issues while standing on the ground observing or teaching. Frequent headaches and/or lightheadedness was reported in 9.9% (33/333) of respondents while riding and in 4.3% 14/329 while on the ground. Horse respiratory health is also negatively impacted with 58% (194/333) of respondents indicating horses cough during or after time in the indoor arena. Instructors who spent time in indoor arenas self-reported more respiratory issues than those individuals who identified as smokers, highlighting the health relevance of understanding these unique structures. To further elucidate environmental concerns and self-reported health issues, 35 facility assessments were conducted in a cross-sectional sampling design in the states of Kentucky and Ohio (USA). Data, including air speeds, were collected in a grid fashion at 15 points within the indoor arenas and then mapped spatially using krigging in ARCGIS. From the spatial maps, standard variances were obtained and differences were analyzed using multivariate analysis of variances (MANOVA) and analysis of variances (ANOVA). There were no differences for the variance of the air speeds in the spaces for facility orientation, presence and type of roof ventilation, climate control systems, amount of openings, or use of fans. Variability of the air speeds in the indoor arenas was 0.25 or less. Further analysis yielded that average air speeds within the indoor arenas were lower than 100 ft/min (0.51 m/s) which is considered still air in other animal facilities. The lack of air movement means that dust clearance is reliant on particle size and weight rather than ventilation. While further work on respirable dust is necessary, this characterization of the semi-indoor environment where animals and humans interact indicates insufficient air flow to eliminate or reduce respiratory hazards. Finally, engineering solutions to address air movement deficiencies within indoor arenas or mitigate particulate matter are critical to ensuring exposures do not lead to adverse health outcomes for equine professionals, volunteers, participants, and horses within these spaces.

Keywords : equine, indoor arena, ventilation, particulate matter, respiratory health

Conference Title : ICOH 2023 : International Conference on One Health

Conference Location : London, United Kingdom

Conference Dates : May 15-16, 2023